REMARKS/ARGUMENTS

The Pending Claims

Claims 1-27 are currently pending. The pending claims are directed to a system for polishing a substrate comprising a liquid carrier, ammonium oxalate, a hydroxy coupling agent, and a polishing pad and/or an abrasive, wherein the system does not comprise an oxidizing agent. The pending claims are also directed to a method of polishing a substrate using the aforementioned polishing system.

Summary of the Office Action

Claims 1-27 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Claims 1-8, 10-13, and 15-27 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Motonari et al. (i.e., U.S. Patent 6,447,695) (hereinafter the Motonari '695 patent) in view of Chopra et al. (i.e., U.S. Patent 6,419,554) (hereinafter the Chopra '554 patent). Claims 9 and 14 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over the Motonari '695 patent in view of the Chopra '554 patent and further in view of Allman et al. (i.e., U.S. Patent 6,541,383) (hereinafter the Allman '383 patent). In addition, claims 19 and 25 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over the Motonari '695 patent in view of the Chopra '554 patent and further in view of Ni (i.e., U.S. Patent 6,503,766) (hereinafter the Ni '766 patent).

Discussion of the Section 112, Second Paragraph, Rejection

The Office Action alleges that claim 1 is indefinite because, "although claim 1 is directed to an apparatus claim, the limitations of "ammonium oxalate" and "a hydroxyl coupling agent" are directed to the material/composition," and cites M.P.E.P. Section 2115, Material or Article Worked Upon Does Not Limit Apparatus Claims, in support of the claim rejection. The Office Action misconstrues claim 1. Claim 1 is directed to a *system* for polishing a substrate comprising (i) a liquid carrier, (ii) ammonium oxalate, (iii) a hydroxyl coupling agent, and (iv) a polishing pad and/or an abrasive, wherein the system does not comprise an oxidizing agent. The limitations of "ammonium oxalate" and "a hydroxyl coupling agent" are directed to components of the claimed system itself, *not* any material or article worked on by the claimed system. Accordingly, the indefiniteness rejection is improper and should be withdrawn.

Discussion of the Obviousness Rejections

The Office Action asserts that the subject matter of pending claims 1-8, 10-13, and 15-27 is obvious in view of the combined disclosures of the Motonari '695 patent and the Chopra '554 patent. In particular, the Office Action relies on the Motonari '695 patent for its disclosure of an aqueous dispersion comprising water, an abrasive, and a silane coupling agent (e.g., a hydroxyl coupling agent), wherein the aqueous dispersion contains no oxidizing agent, but recognizes that the Motonari '695 patent does not specifically disclose using ammonium oxalate in the aqueous dispersion. The Office Action relies on the Chopra '554 patent for its disclosure of a method for using a planarizing solution comprising ammonium oxalate in an aqueous polishing composition. The Office Action alleges that one skilled in the art would have found it obvious to modifiy Motonari's aqueous dispersion to incorporate ammonium oxalate because the Chopra '554 patent discloses that a preferred etching agent such as ammonium oxalate is a reducing agent which complexes the metal to facilitate removal. Applicants traverse the rejection.

Contrary to the Office Action's assertions, one of ordinary skill in the art, at the time of invention, would not have been motivated to combine the Motonari '695 and Chopra '554 patents in such a way as to arrive at the invention defined by the pending claims. The Motonari '695 patent discloses an aqueous dispersion comprising a polishing agent, water, and a polishing rate adjustor. The polishing agent comprises inorganic particles or organic/inorganic composite particles wherein the composite particles may comprise a polycondensate bonded to a polymer particle via a silane coupling agent. By way of contrast, the Chopra '554 patent is generally directed to non-abrasive planarizing solutions for use with fixed-abrasive polishing/planarizing pads (see, e.g., the Chopra '554 patent at col. 2, lines 36-40). While the Chopra '554 patent does provide that the solution can comprise a buffering agent (e.g., ammonium oxalate), the Chopra '554 patent specifically distinguished non-abrasive planarizing solutions from abrasive planarizing solutions and the method disclosed therein from those employing abrasive planarizing solutions. For example, the Chopra '554 patent states that "planarizing solutions developed for non-abrasive pad types are ill suited for use with fixed-abrasive pad types" (the Chopra '554 patent at col. 2, lines 20-23). The Chopra '554 patent further states that "integrated circuit devices produced in accordance with the invention are expected to exhibit physical characteristics different from the physical characteristics inherent in planarizing titanium nitride using non-abrasive planarizing pads in conjunction with abrasive slurry planarizing solutions" (the Chopra '554 patent at col. 8, lines 47-52). Further, the Chopra '554 patent states that "it would be desirable to develop effective planarizing solutions for planarization of titanium nitride on the surface of a semiconductor wafer for use in conjunction with fixed-abrasive planarizing pads"

(the Chopra '554 patent at col. 2, lines 23-26). Additionally, the Office Action incorrectly identifies ammonium oxalate as an etching agent as taught by the Chopra '554 patent. The Chopra '554 patent discloses preferred etching agents including oxalic acid (the Chopra '554 patent at col. 6, line 4), and preferred buffering agents including ammonium oxalate (the Chopra '554 patent at col. 6, line 7).

To establish a prima facie case of obviousness, at least two criteria must be met: (1) there must be some suggestion or motivation to modify the reference or to combine reference teachings, and (2) the prior art references must provide one of ordinary skill in the art with a reasonable expectation of success in so making the subject matter defined by the claims in issue. Both the suggestion and the reasonable expectation of success must be found in the prior art references, not in the disclosure of the patent application in issue. See, e.g., *In re Vaeck*, 947 F.2d 488, 493, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). The Office Action, however, fails to properly identify a suggestion or motivation that would have caused one of ordinary skill in the art, at the time of invention, to combine the cited references in such a way as to arrive at the invention defined by the pending claims.

Thus, rather than motivating the ordinarily skilled artisan to modify the aqueous dispersion disclosed in the Motonari '695 patent in such a way as to arrive at the invention defined by the pending claims, the Chopra '554 patent specifically teaches that abrasive planarizing solutions or systems, such as the aqueous dispersion disclosed in the Motonari '695 patent, are fundamentally different from the planarizing solutions or systems used with fixed-abrasive polishing pads, such as the dispersion disclosed in the Chopra '554 patent. Therefore, contrary to the Office Action's assertions, the ordinarily skilled artisan would not have been motivated to combine the teachings of the Motonari '695 patent and the Chopra '554 patent in such a way as to arrive at the invention as defined by the pending claims. Indeed, the Chopra '554 patent suggests that the ordinarily skilled artisan, having considered the disclosure of the Motonari '695 patent, would not consider art relating to non-abrasive planarizing solutions for potential modifications to the dispersion disclosed therein, or that the ordinarily skilled artisan, having been provided with the disclosure of the Chopra '554 patent, would not consider art relating to abrasive planarizing solutions for potential modifications to the dispersion disclosed therein. Claims 2-8, 10-13, 15-24, and 26-27 depend from, and further limit, claim 1. Accordingly, the rejection of claims 1-8, 10-13, 15-24, and 26-27 should be withdrawn.

Claims 9 and 14 stand rejected in view of the Motonari '695 patent and the Chopra '554 patent and further in view of the Allman '383 patent. The Allman '383 patent does not cure the deficiencies of the Motonari '695 patent and the Chopra '554 patent. The Allman '383 patent relates to an apparatus and method for planarizing the surface of a semiconductor wafer. The method disclosed in the Allman '383 patent comprises application by spraying of

an adherence promoting ligand (e.g., gamma-ureidopropyltrimethoxysilane) onto a wafer track of a planarization surface (the Allman '383 patent at col. 6, lines 52-54) followed by spraying of abrasion particles onto the wafer track (the Allman '383 patent at col. 7, lines 36-38). Apart from a pH control solution, the Allman '383 patent is silent as to other chemical components useful in the disclosed method. Nothing within the Allman '383 patent suggests or discloses that an adherence promoting ligand (e.g., gamma-ureidopropyltrimethoxysilane) would have utility in a polishing system as defined by the pending claims. Accordingly, the ordinarily skilled artisan would have no motivation to combine the disclosure of the Allman '383 patent with either of the disclosures of the Motonari '695 patent or the Chopra '554 patent, let alone the combination of the Motonari '695 patent and the Chopra '554 patents.

The references taken together merely recite various elements of the claimed method. Given that there is no motivation to combine the Motonari '695 patent and the Chopra '554 patent, and no motivation to combine the Allman '383 patent with either of the other two cited references, one of ordinary skill in the art would not be motivated to combine the disclosures of all three of the cited references, except with the improper hindsight of the present invention. Accordingly, the rejection of claims 9 and 14 should be withdrawn.

Claims 19 and 25 stand rejected as obvious over the disclosures of the Motonari '695 patent and the Chopra '695 patent and further in view of the Ni '766 patent. The Ni '766 patent relates to a method and system for detecting an exposure of a material on a semiconductor wafer during chemical-mechanical polishing (see, e.g., the Ni '766 patent at the abstract). The Office Action alleges that the Ni '766 patent discloses that a polishing rate can be optimized by adjusting a polishing parameter such as polishing agent flow. However, the Ni '766 patent does not disclose or suggest any polishing composition or polishing system, let alone a polishing method wherein a copper:tantalum removal rate (i.e., a ratio of copper removal rate to tantalum removal rate for a substrate comprising copper and tantalum) is at least about 1:1. Therefore, the Ni '766 patent cannot properly be considered to supplement the disclosures of the Motonari '695 patent and the Chopra '554 patents in such a way as to motivate one of ordinary skill in the art to combine the disclosures of all three of the cited references and arrive at the invention defined by pending claims 19 and 25. Accordingly, the rejection of claims 19 and 25 should be withdrawn.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Application No. 10/043,534

Reply to Office Action

Respectfully submitted,

John Kilyk, Jr., Reg. No. 30,763
LEYDIG, VOIT & MAYER, LTD.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6780
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile)

Date: June 16, 2005